

# DOCKETED

IN THE UNITED STATES DISTRICT COURT FOR THE  
SOUTHERN DISTRICT OF NEW YORK

MIDWAY MANUFACTURING COMPANY:	:	Deposition of
vs.	:	William L. Harrison
THE MAGNAVOX COMPANY	:	Third Day
and	:	74 Civ 1657 CBM
SANDERS ASSOCIATES, INC.	:	

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946 1030

IN THE UNITED STATES DISTRICT COURT FOR THE  
NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

THE MAGNAVOX COMPANY, et al :	Consolidated Actions
vs. :	74 C 1030 -
	74 C 2510 -
BALLY MANUFACTURING :	75 C 3153
CORPORATION, et al :	75 C 3933

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Continued deposition taken

pursuant to subpoena and notice at the Sanders Associates,  
Inc.; Headquarters, Spit Brook Road; Nashua, New Hampshire;  
Thursday, March 18, 1976; commencing at nine-thirty in the  
forenoon.

**FILED**

001 - 8 1976

**ERNEST W. NOLIN & ASSOCIATES**  
*General Stenographic Reporters*  
369 ELGIN AVE., MANCHESTER, N. H. 03104  
TELEPHONE: 623-6906

U.S. DISTRICT COURT  
NORTHERN DISTRICT OF ILLINOIS

ORIGINAL

(Continued statement by PRESENT:)

Q. I am reminded of For Midway Manufacturing Company, Bally Manufacturing Corporation and Empire:

Donald L. Welsh, Esq., 135 South LaSalle Street, Chicago, Illinois.

For Atari, Inc.:

Flehr, Hohbach, Test, Albritton & Herbert, by Edward S. Wright, Esq., 160 Sansome Street, 15th Floor, San Francisco, California.

Do you believe from examining that that For Sanders Associates, Inc., and Magnavox Company:

Yes, Sir. James T. Williams, Esq., 77 West Washington Street,

I notice in the lower part of the Exhibit 23-34 that Chicago, Illinois.

there is a statement, "Have a phenomenon occur when For Sanders Associates:

the two squares - - -" and then something is crossed out; could you read that? Louis Etlinger, Esq., and Richard I. Seligman, Esq., Daniel Webster Highway, South, Nashua, New Hampshire.

A. "Have a phenomenon occur Stenotype Reporter: squares are coincident - - -" I Ronald J. Hayward a word.

Q. That is crossed out?  
WILLIAM L. HARRISON

A. Yes, Sir.  
called as a witness, having been previously sworn, was further

Q. And then could you go on?  
examined and continued his testimony as follows:

A. "The - - - that two monograms - - -" I am not sure

that the last word is that is crossed out.

(Interrogatories by Mr. Welsh.)

1 Q. When we adjourned yesterday, Mr. Harrison, I believe

7 A. you stated that Mr. Baer had requested that you  
build circuitry for generating two dots and you had  
referred to page 42 of Exhibit 16 and page 33 of  
Exhibit 23, did you build such dot generators?

A. I don't recall; however, Exhibit 23-34 indicates that  
I did build and test that circuitry.

2 Q. Do you believe from examining that circuit that you  
3 actually did that work?

A. Yes, sir.

3 Q. I notice in the lower part of the Exhibit 23-34 that  
there is a statement, "Have a phenomenon occur when  
the two squares - - -" and then something is crossed  
out; could you read that entry, it is a little  
unclear on my copy?

A. "Have a phenomenon occur when the two squares are  
coincident - - -" I believe that is the word.

4 Q. That is crossed out?

A. Yes, sir.

5 Q. And then could you go on?

6 A. "That is, that two monochrome - -" I am not sure  
what the last word is that is crossed out.

6

Q. Could you read the statement as it appears omitting the crossed-out material?

A. "That is, that two monochrome signals are coincident and constant carrier color signal is summed in."

7

Q. Now, could you read the statement omitting the crossed out portions, the entire statement?

A. "Have a phenomenon occur when the two squares or monochrome signals are coincident and constant carrier color signal is summed in."

8  
10

Q. Could you explain what was meant by that statement? Perhaps first it would be desirable for you to read the remaining entry on that page, it does relate to it, does it not?

A. May I have the question back, please?

(Whereupon, the previous question was read back by the reporter.)

11

THE WITNESS: It is indicated on page 34 of Exhibit 23 that it does relate to it.

12

9

Q. Would you read that last paragraph on Exhibit 23-34 into the record, please?

13



A. "Example: The constant carrier color signal alone  
 A. creates a solid color on the CRT. The color depends  
 14 on the setting of the color phase shifter. It will  
 be set for blue. Now, when two noncoincident  
 monochrome signals are added - which has been crossed  
 A. out on my sheet - the effect is two brighter blue  
 15 squares displayed on the CRT. However, when these  
 two monochrome signals are made coincident, the  
 color changes to something towards yellow."

Q. Now, would you explain to me the phrase, "have a  
 A. phenomenon occur when the two squares or monochrome  
 16 signals are coincident and the constant color signal  
 17 is summed in?"

A. It appears at this time that when two squares were  
 coincident and the color signal was added, that I  
 had a phenomena that I did not understand.

Q. In other words, you observed something happen when  
 11 you generated the two monochrome dots and had a  
 constant carrier color signal and the dots coincided?

A. That is the way I understand it now, yes.

Q. You believe that is what happened?

A. I believe it is. color changes to something towards

Q. Was anyone present when you first observed this,

anyone else? ...

A. I do not recall, sir.

Q. Had you prior to that time when you observed this phenomenon observed two dots appearing to coincide on the screen of the television set?

A. I do not recall, sir.

Q. Did you make a note of this phenomenon in your

bound notebook, Exhibit 16?

A. Yes, sir. indicate that you transferred to

Q. Where is that located? this phenomenon to Exhibit 16

A. Page 44, say that, if that occurred?

Q. Would you read the entry there with respect to this phenomenon?

A. <sup>HAVE A</sup> "After phenomena occur when the two characters are coincident, example: the constant carrier color

signal alone creates a solid color on the CRT. The color is dependent on the color phase shifter

Q. circuit. It will be set for blue. Now, when two noncoincident monochrome signals are added, the

A. effect is two brighter blue characters displayed on

Q. the CRT. However, when these two signals are made coincident, the color changes to something towards

A. yellowish red."

18 Q. Did you report this phenomenon to Mr. Baer?

A. I do not recall, sir.

19 Q. The entry on Exhibit 23-34 is dated 5-23-67, is

A. it not?

A. Yes, sir.

20 Q. And the entry on page 44 of Exhibit 16 is dated  
5-24-67, is it not?

A. Yes, sir.

21 Q. Does that indicate that you transferred the  
information regarding this phenomenon to Exhibit 16  
on the day after, if that occurred?

A. I do not recall.

22 Q. That was your practice, however, was it not, to  
date the entries in Exhibit 16 as of the day the  
entries were made?

A. I believe I would have dated it the day that I  
signed the notebook.

23 Q. And in that regard, was it your practice to sign  
the notebook on the day that you made the entry?

A. I believe it was in most cases.

24 Q. Do you have any reason to believe that it was not  
done here?

25 A. No, sir.

25 Q. Did you do anything else with respect to the  
coincidence phenomenon shortly after you observed

A. it?

A. I do not recall; however, I do not find anything  
to indicate that I did.

26 Q. Would you explain what you did next after observing  
the phenomenon?

30 A. I do not recall; however, Exhibit 16, page 45 indicates  
that I attempted to make one of the characters in  
color.

27 Q. Did you do that?

31 A. Yes, sir, I believe I did.

28 Q. And what was the effect so far as what the viewer  
saw is concerned?

A. When the color field was adjusted for a general  
background, the character became blue - - - No, I  
am sorry, the color character appeared to be red  
and the rest of the field was some color which I  
don't seem to have indicated here. And when the  
color field was adjusted for a green background,  
the color character is red and the monochrome  
character becomes blue.

29 Q. Well, with the color character appearing to be red,



Q. did it appear to disappear when the background field color was changed to red?

A. I do not recall, sir; however, on Exhibit 16, page 45, it is indicated that via a coincidence gate, the timing circuit SCR is turned on and the red character disappears as the color field changes from green to solid red except for the blue character which

A. remains, I believe so.

Q. Do you believe that what is indicated there actually happened?

A. Yes, sir, I do.

Q. Did you provide some circuitry to cause the background color to change to red upon coincidence of the two characters?

A. I do not recall; however, Exhibit 16, page 41,

A. I believe shows the timing circuit that changed the color field after a predetermined time?

Q. I believe the question was whether you provided circuitry to cause a change in the background color when the two dots coincided or the characters

A. coincided. I do not recall, however, Exhibit 16,

Q. page 45 at the bottom of the page indicates that I did provide a circuit.

4/19/76  
WLN

37

4/19/76  
WLN

32 Q. Do you believe that you provided such a circuit?

A. Yes, sir, I do.

33 Q. What was the circuit?

A. Exhibit 16, page 45, at the bottom of the page,  
a coincidence circuit whose output drives an  
SCR gate in the timing circuit.

34 Q. That is the timing circuit on Exhibit 16-41?

A. Yes, sir, I believe so.

MR. WELSH: Could I have that

A. answer back? Is a schematic of circuit's appearance

with work that I had done prior to this.

(Whereupon, the previous  
answer was read back  
by the reporter.)  
adaptable to that of country.

35 Q. Did you actually build that coincidence gate?

A. I believe I did, sir.

36 Q. Was it your idea to build it?

A. I do not recall, sir.

37 Q. Was it your idea to use it to drive the SCR gate  
in the timing circuit?

A. I do not recall, sir.

38 Q. Now, you have used the term monochrome character  
and also the term color character, I believe, what

20 Q. Before you go further, I would like to ask that  
A. you start at the beginning of that group and tell  
us which entries do not relate to work in which  
you were aiding Mr. Rusch?

A. I would say that they are all related to the  
work that I was doing with Mr. Rusch; however,  
30 I am not sure about 23-110, 23-128 and 23-131.

21 Q. What is there about 23-110 that causes you to be  
uncertain?

A. It looks like a schematic of circuits associated  
with work that I had done prior to Mr. Rusch coming  
aboard and that perhaps I had noticed that the  
sync. generators that he had generated would be  
adaptable to that circuitry.

22 Q. For the prior circuitry?

A. Yes.

23 Q. And with respect to 23-128, what is there about  
42 that that makes you uncertain as to whether it  
was work in which you were aiding Mr. Rusch?

A. That again looks like the delay multivibrators  
that I had previously used and was trying to come  
up with a method of voltage control of those  
43 delay times rather than just a resistive control.

Q. Is a monochrome character visible when...

A. A monochrome character would signify to me that

it only has to do with brightness or intensity

modulation of the three beams to produce what would

be considered black and white video in a color

TV monitor.

Q. And did such monochrome character tend to simply

become a bright spot of the same color as the background color of the field?

A. I do not recall, sir; however, in Exhibit 16, page 45,

it indicates that the monochrome character became blue with a colored background.

Q. Do you believe that that is what happened?

A. Yes, sir, I do.

Q. What is the meaning of the term "color character"?

A. The color character would have been the character generated in the chroma gating circuit.

Q. Did it differ in appearance from the monochrome

circuit? I believe it did.

A. Exhibit 16, page 45, indicates that it was colored red.

Q. Do you believe that that is true?

A. Yes, I do.



Q. Is a monochrome character? Is visible when?

A. A monochrome character would signify to me that it only has to do with brightness or intensity modulation of the three beams to produce what would be considered black and white video in a color TV monitor.

Q. And did such monochrome character tend to simply become a bright spot of the same color as the background color of the field?

A. I do not recall, sir; however, in Exhibit 16, page 45, it indicates that the monochrome character became blue with a colored background.

Q. Do you believe that that is what happened?

A. Yes, sir, I do.

Q. What is the meaning of the term "color character"?

A. The color character would have been the character generated in the chroma gating circuit.

Q. Did it differ in appearance from the monochrome circuit? I believe it was.

A. Exhibit 16, page 45, indicates that it was colored red. background was changed to red?

Q. Do you believe that that is true?

A. Yes, I do.

44 Q. Was the color character still visible when the  
50 background color changed to red?

A. Exhibit 16, page 45, indicates that the red character  
disappears as the color field was changed from green  
to solid red.

45 Q. Do you believe that that is what happened?

A. Yes, I do.

46 Q. Did the monochrome character remain visible after  
changing of the background color of the screen to

red?

A. May I have that question read back, please?

that last question. I would have answered on  
(Whereupon, the previous  
rather I would have indicated that the question was read back  
the separate miniboxes myself.  
by the reporter.)

Q. What did Mr. [redacted] say?

A. He would have connected THE WITNESS: Exhibit 16,  
page 45, indicates that the blue character remained.

47 Q. That was the monochrome character?

A. Yes, sir, I believe it was.

48 Q. And do you believe that the character remained when  
the background color changed to red?

A. That the character remained?

49 Q. Yes, sir, it was those?

A. I believe that the character remained.

Q. What happened next in your development work on the TV game project?

A. I do not recall; however, Exhibit 16, page 46, indicates the control potentiometers have been mechanically assembled in separate boxes to function as joy sticks.

Q. Do you believe that that is what happened?

A. Yes, but not by me.

Q. Who did that?

A. Pat Berry. I would like to correct myself on that last statement. I would have assembled or rather I would have installed these joy sticks in the separate miniboxes myself.

Q. What did Mr. Berry do?

A. He would have connected the potentiometers with the mechanics necessary to make them into joy sticks.

Q. Did you make electrical connections of the potentiometers?

A. I do not recall; however, Exhibit 16, page 46, indicates that I did connect them into the proper circuits. I recall.

Q. What circuits were those?

A. Those would have been the character generator positioning circuits.

56 Q. One joy stick for each character?

A. Yes, sir.

57 Q. What occurred next in your work on the TV game project?

A. I do not recall; however, Exhibit 16, page 46, indicates that next we attempted to make an RF stage and modulator to replace the Heathkit IG-62.

58 Q. What was the purpose of that?

A. This would have been the new means in which to couple our characters or our video display to the television set in place of the Heathkit IG-62.

59 Q. As of May 24, 1967, the date on page 45 of Exhibit 16, had you built any circuitry which would cause disappearance of one of the two characters upon coincidence of characters on the screen of the TV set when both were monochrome characters?

A. Not that I recall, sir.

60 Q. And in the materials which we have discussed so far, that does not appear, does it?

A. Not that I recall, sir.

61 Q. What happened next in your work on the TV game project?



3<sup>rd</sup> DAY

pg 15 LINE 14 - I believe it should be "from ~~12~~  
12 piconarads to 22 piconarads"

A. I do not recall; however, Exhibit 16, page 47, indicates that I spent a day cleaning up the breadboard and mounting it in an aluminum box.

Q. Was there any particular purpose for doing that?

A. I do not recall the purpose, sir.

Q. What was the next work you did on the TV game project?

A. I do not recall; however, Exhibit 16, page 47, indicates that I had trouble with the color output level due to 12 picofarads of capacity between its terminals. That is, its phase shift pot. Between its terminals and mounting case. I then changed the phase shift pot from 50 to 10K and the phase shifter capacity from picofarads to 27 picofarads and I also isolated the 10K pot from its chassis which improved the color and the control of the color.

Q. What happened next?

A. I do not recall; however, Exhibit 16, page 48, indicates that I modified the circuit shown on page 45 to reduce color delay and overshoot of the second character which is the color square.

Q. Have you been commencing most of your answers with the phrase, I don't recall, as a result of

instructions from Mr. Williams?

MR. WILLIAMS: I object to the question as calling for information protected by the attorney-client privilege and I instruct the witness not to answer.

THE WITNESS: I refuse to answer on the advice of counsel.

66 Q. Have you also been instructed to state that the pages of these exhibits indicate something rather than stating that you believe that something occurred that is noted there?

67 MR. WILLIAMS: I object to the question as calling for information which is protected by the attorney-client privilege and I instruct the witness not to answer the question.

THE WITNESS: I refuse to answer on the advice of counsel.

69 MR. WELSH: I would like to suggest that it might save time if when you are indicating that the page says something, if you believe that that actually occurred, that you might so state so I won't have to keep asking you the question, Do you believe that that occurred? just

in the interest of moving along.

MR. WILLIAMS: Well, Mr. Welsh, I think that what you have here is a situation where the witness is being very careful in giving you accurate answers to the best of his ability and I think that his answers should continue to be in response to your questions.

67 Q. What happened next, Mr. Harrison?

A. I do not recall; however, Exhibit 16, page 48, 49 and 50 indicate to me that I next proceeded to work on a circuit to allow audio to be transferred to the TV receiver and I believe I did do this.

68 Q. Do any of the pages on Exhibit 23 relate to that  
72 work?

A. Yes, sir, pages 38 and 39.

73 MR. WELSH: Off the record.

74 (Whereupon, a recess  
75 was taken.)

69 Q. Would you tell us what you did next on the TV  
75 project?

A. I do not recall; however, Exhibit 16, page 50,  
indicates that an inexpensive tape recorder was



76 Q. utilized to see if an audio recording could be  
 A. shipped via our audio modulator to the television  
 set. I believe I did that.

70 Q. Was there any particular purpose in your doing  
 that?

A. As I recall, it was done to determine if we could  
 utilize the audio portion of the television set.

78 71 Q. What did you do next?

A. I do not recall; however, Exhibit 16, page 50,

indicates that I could with a character generator  
 produce a horizontal bar or a vertical bar by

grounding particular points in that character  
 generator circuit.

80 72 Q. That is the circuit shown on page 50 of Exhibit 16?

80 A. Yes, sir.

73 Q. What was the purpose of generating bars?

81 A. I do not recall the purpose at that time.

74 Q. Is there anything on the exhibit to refresh your  
 recollection?

82 A. I do not find anything during that time period.

ea 75 Q. Were the bars to be used or generated in place of  
 dots or in addition to dots?

A. I do not recall at this time.

76 Q. What did you do next?

07 76 A. I do not recall; however, Exhibit 16, page 52,  
95 indicates through experiment that by connecting  
an audiooscillator to the end of the potentiometers  
in the timing circuits of the character generator,  
that multiple squares were produced on the screen  
and I believe I did that.

47 77 Q. Were the positions of the squares variable?

A. I do not recall.

78 Q. You did not comment about page 51 of Exhibit 16,  
did you make the entry on that page?

A. Yes, sir, I did.

79 Q. Was the entry there your idea?

27 A. No, sir, it was not.

80 Q. How do you know that it was not?

87 A. I am sure it was not.

81 Q. How are you sure?

47 81 A. It is Mr. Baer's idea.

82 Q. How are you sure that it is his idea?

A. Mr. Baer's signature on the page.

27 83 Q. Now, his signature appears on other pages also,  
90 does it not?

A. Yes, sir.

84 Q. Are you sure that that was his idea because of the  
absence of your signature on that page?

A. Yes, sir.

85 Q. Was the information entered on that page copied from  
previously marked Exhibit 9-73?

A. Yes, sir, I believe it was.

86 Q. Exhibit 23-40 appears to have the same date of  
June 1, 1967, as page 52 of Exhibit 16, do the  
entries on Exhibit 23-40 relate to any work done  
by you?

A. When you say relate to work done by me, do you mean  
this piece of paper or do you mean equipment?

87 Q. I meant equipment.

A. I do not recall, but I do believe I did.

88 Q. You constructed a rotary switching mechanism similar  
to what is drawn here?

94 A. Yes, sir, I believe that is true.

89 Q. What was the purpose of that?

A. It was done for the purpose of having convenience  
switching of functions, that we could perform up to  
that time.

90 Q. What functions were those?

A. From the information in Exhibit 23-40, I cannot

Q. tell just from looking at that page. you tell me.

Q. Do you recall from the pages you have been referring to? Are there any that exist at that time?

A. I cannot tell, sir, without seeing the overall schematic that ties in this switch.

Q. You do see one? Are connected with the power?

A. I say I cannot tell without seeing an overall schematic which would tie in this switch.

Q. Is there such a schematic? I direct your attention to Exhibit 23-75 and 23-73 and 23-74?

A. Mine jumps from 72 to 76.

(Discussion off the record.)

I thought, but I thought too quick.

Q. You stated the correct THL WITNESS: Sir, I do not believe I can accurately answer that question now without taking a fairly long period of time.

Q. Well, do you have any recollection at all from the testimony which you have given? For example,

A. you have been describing control of two dots through

A. separate potentiometers, you have described a

split field with the position of the horizontal

split being movable vertically, do you recall those?

A. Yes, sir. I recall that the potentiometers were connected

95 Q. So just from your recollection, can you tell us what functions, at least some of the functions, that you knew that existed at that time?

MR. WILLIAMS: Are you asking for the functions that existed at that time or the functions which are connected with the rotary switching arrangement shown on Exhibit 23-40?

96 MR. WELSH: Well, this entire questioning has been related to the switches on Exhibit 23-40 and, of course, that is what I am referring to.

MR. WILLIAMS: That is what I thought, but I thought the question was vague.

96 Q. You stated the purpose of that was to provide a convenient switching into the different functions that they could perform at that time and the question was, What were those functions?

A. I do not --

97 Q. To the extent that you recall, if any?

A. I do not recall at this point in time, other than drawing this sketch of switching, exactly what I did. At that time, I do not recall.

98 Q. The question was, What functions were concerned



about switching conveniently, do you recall any of those?

A. I do not recall; however, Exhibit 23-40. I see a word or a group of words that say junction integrating tap, pump game, which would lead me to believe that that was one of the functions that this switch provided, to lead to the pumping game.

99 Q. Perhaps the difficulty here is with regard to what the word "recall" means to you. Do you not recall moving two dots around?

MR. WILLIAMS: Mr. Welsh, I still think that your question is unclear. You keep saying you want him to tell you what was connected with the rotary switching arrangement of 23-40 and he says he doesn't recall that and then you relate back to prior testimony relating to other apparatus which may or may not be connected with the switching of 23-40.

MR. WELSH: He remembered that the purpose of the switch was to provide convenience switching of the different functions they could perform at that time. I wonder if his recollection has been refreshed by examining the documents which

he prepared which were dated up to that time.

Perhaps he does not understand that if one refreshes his recollection from documents, that that can be a basis of recalling something. Perhaps examining these documents has not refreshed your recollection, Mr. Harrison, I don't know. You stated that you

believed that certain things that are indicated on these various pages occurred on the date that the pages bear. That to me would indicate some

refreshment of your recollection. Perhaps I don't understand what you mean when you say you don't recall, whether that is a specific recollection of an occurrence on a particular date with a certainty within your recollection without reference to other

A. materials as to when that date occurred. If you have

Q. some refreshment of your recollection as a result of examining these documents and can state what

A. you believe, if anything, in response to the questions,

I think it would be appropriate for you to answer even though you do not have a specific recollection

Q. that a specific thing occurred on a specific date

A. Without reference to documents.

cell and it was THE WITNESS: What was the last

word, sir?

THE WITNESS: Without reference

to any documents.

Q. Do you believe that you have any recollection of any of the functions which you could perform as of this time which was June 1, 1967?

A. I do not recall these events other than what I see in this notebook up to this time and I am sure they occurred, but I do not recall the specific events.

Q. Well, having a belief that they occurred from examining your notes, do you recall from the notes which you have examined any of the functions which you stated you believed had been performed up to this time, which is June 1, 1967?

A. The question is unclear to me.

Q. What did you do next in your work on the TV game project?

A. I do not recall; however, Exhibit 16, page 53 and Exhibit 23-41 indicate that I began work on a target-shooting game.

Q. What did your work consist of?

A. My work consisted of obtaining a photoconductive cell and it was connected to an SCR to operate the

chroma gating circuit.

104 Q. What was the game to consist of?

A. As I recall, to shoot at the brighter square and to change the background color to red.

105 Q. Upon what occurrence was the background color to change to red?

4/19/76 W.L.N.  
A. Under the condition that the tube <sup>with supply to</sup> at the photocell mounted at the end of it was directed at the brighter square and detected the bright light. <sup>restructured</sup>

106 Q. Were there more than one square?

A. I do not recall, sir.

107 Q. You say brighter square, that is a comparative, brighter with respect to what?

A. I would reword that to say the brightest square.

108 Q. Brightest would contemplate more than one also, brightest with respect to what?

A. I do not recall if there was another square. <sup>dated</sup>

109 Q. What happened next?

A. I do not recall; however, Exhibit 16, page 54 and Exhibit 23-42 indicate that I made two - made a power supply, built-in type, to replace the lab supply that I was using at that time and I believe I did it.

110 Q. Now, going back to the target game, did you actually  
construct circuitry and achieve any results?

117 A. I can't recall, but I do believe I did.

111 Q. Did you achieve the results you sought of changing  
the background color to red?

113 A. I do not recall, but I believe I did.

112 Q. Why did you wish to construct a power supply to  
replace available power supplies?

A. I do not recall; however, I believe I was instructed  
to do so by Mr. Baer.

113 Q. Did he tell you the purpose for doing that?

A. I do not recall, sir.

114 Q. Were you at that time constructing a self-contained

A. unit perhaps rather than just a breadboard of  
different individual circuits?

A. I do not recall.

115 Q. With respect to Exhibit 16-74, I believe you stated

that indicated you spent the day cleaning up the

breadboard and mounting it in a box, does that

refresh your recollection at all?

A. I do not recall, but I believe that would be true.

116 Q. How did you happen to start work on the target-  
shooting game?



A. I do not recall; however, I believe I would have been instructed to do so by Mr. Baer.

117 Q. Was the idea of having a target-shooting game yours?

A. Yes, sir, 58, 59, 61 and 62.

A. I do not recall, sir.

118 Q. Was it Mr. Baer's?

A. I do not recall, sir.

119 Q. What did you do next in the TV game project?

A. I do not recall; however, Exhibit 16, page 55, (Whereupon, the luncheon recess was taken.) indicates to me that I took the TV generator unit to my residence to see if it would play into my

Heathkit color television set. I believe was stated

120 Q. Did it?

A. Yes, it did, sir, pages 46 and 47 of Exhibit 23

121 Q. Do you recall that or are you referring to the exhibit?

A. Do I recall having done that, sir?

122 Q. Yes, sir, are you referring to the one that was

A. Yes, sir, earlier when the light of the

123 Q. What did you do next?

A. I do not recall; however, Exhibit 16, page 58, 59, and 60, 61 and 62 indicate that we modified the target-shooting game in such a way as to have

a random pulse generator move the target randomly for a target-shooting game, which I believe I did.

Q. What pages of Exhibit 16 were involved?

A. Page 58, 59, 60, 61 and 62.

Q. Did you also refer to any page of Exhibit 23?

A. Page 46, 47 and 48.

MR. WELSH: I see it is noon, let's break for lunch. Exhibit 16-47?

A. 16-47.

(Whereupon, the luncheon

recess was taken.)

Q. (By Mr. Welsh) Mr. Harrison, I believe you stated with respect to pages 58, 59, 60, 61 and 62 of

A. Exhibit 16; and pages 46 and 47 of Exhibit 23

Q. indicated that you had modified the target-shooting

A. game to have a random pulse generator to move the

Q. target randomly; did that target-shooting game

otherwise operate similarly to the one that you described earlier where when the light of the

bright spot was detected in the photoconductor

A. cell, that the background changed - the background

Q. color of the screen changed?

A. I don't recall, but I believe it did.

127 Q. I believe you did not refer to pages 56 and 57 of  
 128 Exhibit 61 or page 43, 44 and 45 of Exhibit 23;  
 what do those pages relate to?

A. As I recall, they relate to data that I took at home  
 when I took that breadboard box home to try on the  
 Heathkit TV.

126 Q. Is that the same breadboard box that you referred  
 A. to in connection with Exhibit 16-47?

124 A. 16-47? This is Exhibit 16.

127 Q. Yes, sir.

135 A. I believe it was. And how do you identify it?

128 Q. Do you recall the appearance of that breadboard  
 A. box?

136 A. Do you mean at all? Of the demonstration?

129 Q. Yes, sir.

137 A. Yes, sir. Was it a demonstration model?

130 Q. Would you examine the various models that are  
 138 located at the other end of the room and see if

A. you recognize any of them as being that breadboard  
 139 box? You have any thing to go with that demonstration?

A. I believe this would be it.

131 Q. Now, you have picked out this box which is marked  
 Exhibit 28? Is that correct?

A. Yes.

132 Q. What did you do next in your work on your TV game development?

141 A. I do not recall; however, on Exhibit 16, page 63, that unit was used to demonstrate to Mr. Etlinger and Mr. Campman.

133 Q. By this unit, do you mean Exhibit 28?

142 A. If that is Exhibit 28.

134 Q. Yes, this is Exhibit 28.

A. Yes, sir.

135 Q. This is the breadboard box that you identified earlier?

143 A. Yes, sir.

136 Q. What was the date of the demonstration?

A. 6-14-67.

137 Q. And to whom was the demonstration made?

A. To whom?

138 Q. Yes.

A. To Mr. Etlinger and Mr. Campman.

139 Q. Did you have anything to do with that demonstration?

A. Yes, sir, I was there.

140 Q. Could you describe what you recall took place at the demonstration?



A. As I recall, we demonstrated the games that that box would play, was capable of playing. In what order, I do not recall.

141 Q. Without referring to the document, could you tell us what you do recall of the games that were played?

A. Are you asking, Do I recall playing these games at that time?

142 Q. Well, I am asking you to tell us what you recall as to what games were demonstrated and what took place at the demonstration.

A. I believe I recall the target-shooting and that is the only one that is clear in my mind at this time.

143 Q. Who was present besides you and Mr. Etlinger and Mr. Campman?

A. Mr. Baer.

144 Q. Did anyone have charge of the demonstration?

A. Yes, sir.

145 Q. Who?

A. Mr. Baer.

146 Q. There were only the four of you present?

A. As I recall, that is correct.

147 Q. At what time of day did the demonstration take place?



A. In the evening.

148 Q. Late in the evening?

A. I do not recall the hour; I do recall it was after  
155 the working day.

149 Q. Was there any particular reason that it was held  
after the working day rather than during the working  
day?

A. I do not recall the reasoning.

150 Q. What did you do during the demonstration?

A. As I recall, Mr. Baer and I would participate in a  
game and then invite one or both of the other men  
to join in.

151 Q. Were any overlays used?

A. As I recall, there were.

152 Q. Did you use overlays for the target game?

A. I do not recall at this time, but I don't think  
we did.

153 Q. What games required overlays at that time?

A. I only recall two: one was for the firefighter  
game and the other was the color spinning game,  
the color wheel spinning game.

154 Q. How did the color spinning game operate or how was  
it played?

A. As I recall, there was a wooden or some sort of disk on top of that shaft. I believe the one to the left, sir.

Q. This one? (Indicating)

A. That one.

Q. Does the shaft about which we are speaking have any label on Exhibit 28?

A. Yes, sir.

Q. What is the label?

A. Phase shift.

Q. Could you go on and describe the game? I believe you were describing the color spinning game and you said there was a disk attached to the shaft. It and then I interrupted you so we could identify what shaft you were speaking about. Now, would you go on and continue to describe your color-spinning game?

A. As I recall, you would spin that wheel and, as I recall, we only used the three colors to identify where the wheel had stopped, blue, red or green; and, depending upon which color came up, as I recall, there was scoring data written on the overlay that was on the screen so that you could score yourself.

Certain colors I believe you added score and I don't recall at this time exactly how that was done.

Q. And the firefighter game, that is the one you

A. described earlier?

A. Yes, sir.

Q. Do you now recall whether you played either of those games at that demonstration?

A. If I did? describe how those games were played?

Q. Or if such games were demonstrated.

A. I am sure it was; however, I don't recall it at the moment.

Q. Do you recall a fox and hounds or fox hunt or steeple chase game having been demonstrated at that time?

A. It is very vague, sir; however, I believe it may

A. have been. I am sure it was if the box was capable of playing that game at that time.

Q. Do you know whether the box was capable of playing the game at that time?

A. I do not recall, but I believe it was.

Q. Would you describe how that game was played? What the players saw and did?

A. Which game, sir?

165 Q. The fox and hounds or what name did -- -- --

A. That may have been it.

166 Q. What names did you know the game by?

A. Fox and hound is a familiar one and chase game is familiar.

167 Q. Were they the same?

A. As I recall, yes, sir.

168 Q. Could you describe how those games were played?

A. There were two characters on the screen, square characters: one was the chaser and one was the chasee; and upon coincidence of these two spots, the chasee would disappear.

169 Q. Was this disappearance similar to that which was

A. described earlier this morning resulting from a

176 Q. change in the color of the background?

A. I do not recall, sir.

170 Q. That is the only type of disappearance which has

177 Q. been found in your testimony up to this time,

A. is that correct?

178 A. As I recall, yes, sir.

171 Q. Did anyone make any notes of the games that were

A. played at the demonstration?

179 A. I do not recall, sir.

Q. Now, you have referred to page 63 of Exhibit 16,  
there appear the signatures of Mr. Etlinger and  
Mr. Campman on that page, do there not?

A. Page 63?

Q. Yes, attachment?

A. Yes, sir.

Q. Did you see them sign that page?

A. Yes, I did.

Q. Now, the note there states, "On June 14, 1967,  
observed and participated in complete set of games  
subscribed in summary of major games dated 6-6-67  
by R. Baer." Are you familiar with that summary of  
major games?

A. Am I familiar with them? Two, three, he starts

Q. Yes, did you at that time see that summary?

A. I do not recall, but - Did I see the sheet  
that would have summarized these games?

Q. Yes, this procedure is repeated five times.

A. I do not recall.

Q. There are two pages, loose pages attached to page 63,  
are there not?

A. Yes, sir, there are.

Q. Have you seen those pages before?



A. I do not recall, sir.

180 Q. Do you recognize that as Mr. Baer's handwriting?

181 A. Yes, sir, I do .

182 Q. Would you read the description of the game No. 2 in  
183 that attachment?

A. Steeple chase is crossed out and it reads fox hunt.

MR. WILLIAMS: Do you need to  
read it for the record?

MR. WELSH: Yes, would you  
read it for the record?

THE WITNESS: "Three players  
required. One hunter, one fox, one scorekeeper.  
Chaser is white. Chased is red. Rules: Chaser  
says ready, set, go, one, two, three. He starts  
chasing fox - which is written over, hare after  
saying go. All action ceases if a hit is made  
turning screen red or if no hit is made after saying  
three, this procedure is repeated five times.  
The scorekeeper records hits, example, one out of  
five, two out of five, four out of five, five out  
of five. After five turns, chaser becomes fox,  
scorer becomes chaser, hare becomes scorer, etc."

188 Q. Is that consistent with your recollection as to how  
182

the chase game was played?

182 A. That is familiar to me.

183 Q. And is it consistent with your recollection?

A. Before or after I read this statement?

184 Q. After you read the statement.

A. Yes, sir.

185 Q. Is there any indication there as to how the - as to  
186 whether the disappearance of one of the squares  
187 occurs as a result of the background changing to the  
188 color of the square?

A. Yes, sir, there is.

186 Q. That is the way in which the square appears to  
disappear, does it not?

A. Yes, sir.

187 Q. Did you participate in any other demonstrations  
188 of the TV games on or about that same time?

A. I do not recall; however, Exhibit 16, page 63B,  
indicates that the demonstration was again made to  
Mr. Etlinger, Mr. Campman - - - I am sorry, to  
Mr. Sanders, Mr. Pope and Mr. Chisholm the next  
day, 6-15-67.

188 Q. Do you recall participating in a demonstration

A. before Mr. Sanders, Mr. Pope and Mr. Chisholm?

A. Yes, sir.

Q. At that time, Mr. Sanders was president of the company, was he not?

A. Yes, sir, I believe he was.

Q. Mr. Pope was a vice-president?

A. I do not recall if Mr. Pope was a vice-president at that time.

Q. Do you know what Mr. Chisholm's position was?

A. At that time?

Q. Yes.

A. I do not recall, sir.

Q. Was the same demonstration given for Mr. Sanders, Mr. Pope and Mr. Chisholm as had been given to Mr. Etlinger and Mr. Campman?

A. As I recall, it was.

Q. I refer you now to Exhibits 23-73, 74, 75 and 79, 80 and 81 within the color television set.

A. Could I have those numbers again, please?

Q. Yes, 73, 74, 75, 79, 80 and 81.

A. I have 73, 74, 75, 79, 80 and 81, is that correct?

Q. Yes. They all bear your signature and the date

Q. June 14, 1967, do they not?

A. Yes, sir, they do.

197 Q. That is the same date as the date of the demonstration  
noted on page 63 of Exhibit 16?

A. Yes, sir, it is.

198 Q. Are those drawings represented by these Exhibits 23-73,  
74, 75, 23-79, 80 and 81, drawings of the apparatus  
that was used in the demonstration on that date?

A. Yes, sir, I believe it is.

199 Q. After that date of the demonstration to Mr. Etlinger  
and Mr. Campman and the demonstration on the following  
day for Mr. Sanders, Mr. Pope and Mr. Chisholm,  
what happened next in the TV game development so far  
as you were concerned? Then at all or there

A. I do not recall; however, Exhibit 16, page 64 the  
indicates to me that I may have been asked to  
draw a block diagram on what it might take to just  
produce the target-shooting game alone utilizing  
circuitry within the color television set.

200 Q. Did you proceed with such work?

A. It is not clear to me at this time that I did.

201 Q. Does page 65 relate to that same work?

A. I believe it does, sir.

202 Q. What are the next pages in the book after page 65;  
that is, of Exhibit 16?

A. The next page is, 66 - there is two page 66 because of the back sheet here. They have notes of Mr. Baer's attached to them.

Q. Had you seen those notes at that time?

A. I do not recall, sir. I have a good or have difficulty

Q. You do have entries on pages 65 and 67 dated June 15, 1967, do you not?

A. Yes. Did you desire such entries?

Q. The two pages 66 are in between the two pages bearing the same date in your handwriting, is that correct?

A. Yes, sir. 6, page 66 is a

Q. And you have no recollection at all of these pages having been there from the time that you made the entry on page 65 until the time you made the entry on 67? Did you modify the horizontal and vertical

A. I do not recall them. I use different type, some

Q. Do you recognize these attachments to page 66 in

any way? What date?

A. I just do not recall. I do not try to utilize

Q. You do not recall?

A. I do not recall. I do not

Q. Do you recall what happened next in the TV game development so far as you are concerned? I later that

210 A. I do not recall; however, Exhibit 16, page 68,  
indicates that I next redesigned the horizontal  
and vertical sync. generators.

Q. Why was that done?

A. As I recall, it was to have a unit or have circuits  
that would work off a battery instead of having  
a line attached to the box.

Q. And did you design such circuitry?

A. Yes, I did, sir.

Q. And is that represented in these exhibits?

A. Exhibit 16, page 68 and 69.

Q. What did you do next in connection with the TV  
game project?

A. I don't recall; however, Exhibit 16, page 70,  
indicates that I modified the horizontal and vertical  
delay multivibrators to use different transistors  
from what I had previously used.

Q. Why was that done?

A. As I recall, sir, we were trying to utilize less,  
expensive transistors.

Q. And what did you do next?

A. Apparently at that same time I made changes in the  
components to the RF oscillator and oscillator that



I referred to on Exhibit 16, page 46.

216 Q. And the date of that page is June 19, 1967?

A. Yes, sir.

2 MR. WILLIAMS: That is, the date of page 70?

MR. WELSH: Yes.

217 Q. Is something bothering you?

There

4/19/76 WLN. A. That is a gap in the dates here.

218 Q. I noted that also. The next entry in the book is dated July 7, '67, is it not?

219 A. Yes. As I recall, I went on vacation.

219 Q. That is also the date of the next page in Exhibit 23, is it not?

220 A. Yes, sir, it is.

220 Q. I might note that Exhibit 23-49, which is that next page in Exhibit 23 bearing the date July 7, 1967, is one of a group of sheets stapled together numbered from the top one 23-49 through 23-71; the date of the last one, 23-71, is August 10, 1967, but there are two earlier sheets, 23-69 and 23-70 which are dated September 6 and apparently September 7 respectively. So that while these sheets are stapled together they do not appear to be in exactly

chronological order; so if, as you go through them, I might note this so you will be able to be aware of it. What did you do next after you returned from your vacation?

A. I do not recall; however, Exhibit 16, page 71, indicates that I next tried to have a target-shooting game whereby I had a monochrome signal that would disappear upon detecting the light from that signal on the screen. I do not recall if 7-7-67 was the day I returned from vacation.

221 Q. At least that is the date of the next entry in Exhibit 16?

A. Yes, sir.

222 Q. You said you tried to have the target-shooting game with the monochrome disappear upon detecting light from that signal on the screen, were you successful in that effort?

A. Exhibit 16, page 72, indicates to me that I did.

223 Q. That is that you were successful in that attempt?

A. Yes, sir.

224 Q. What on that page 72 so indicates that?

A. The bottom of the page - I am sorry, that page indicates that I had produced a spot on the TV screen

and I was making resistance measurements of the photocell as to the light that it received. It is not clear to me at this time as to what the outcome of that experiment was.

225 Q. Now, did you contemplate achieving disappearance of the monochrome signal upon detecting light from the signal on the screen?

226 A. By use of what is called a crowbar circuit to interrupt the signals out of a spot generator or a character generator.

227 Q. Is that circuitry depicted in the lower left portion of page 71 of Exhibit 16?

228 A. Yes, sir.

229 Q. Was that circuitry built and tested?

A. Yes, sir, I believe it was. It is clear to me on page 71 of Exhibit 16 that it did indeed work.

230 Q. And what is there on that page that so indicates?

A. As stated on that page that this configuration results in target disappearing when hit is made.

231 Q. And how is it determined when a hit is made or how was it determined when a hit was made?

A. By the target disappearing.

232 Q. What constituted a hit then?

A. Reception of the light on the screen by the photocell.

Q. And what did that result in?

A. In firing a crowbar, an SCR which disabled what was termed or labeled a pulse shaper and an and gate.

Q. That was due to a change in resistance of the photocell upon receipt of the hit?

A. Yes, sir.

Q. Where was the photocell located?

A. It is indicated in Exhibit 16 on page 72 that it was at the end of a tube of some sort. As I recall, it was a cardboard tube or a phenolic tube, I don't recall which, either one or the other.

Q. Intended to simulate a gun?

A. Yes, sir. (Whereupon, a recess was taken.)  
 MR. WELSH: Let's take a break at this time.

(Whereupon, a recess

was taken.)

Q. Would you go on as to what you did next in your work on the TV game project?

A. I don't recall; however, Exhibit 23, page 50, 51, 52, and 53 of Exhibit 23 indicates to me that I

did some research in terms of the types of photocells.

I apparently obtained some different types and made some resistance measurements.

Q. What did you do next?

A. I don't recall; however, Exhibit 23 - 54 indicates to me that I began to lay out at least on paper a box that would receive plug-in models. I believe that may be all that I did with it at that time.

Q. Did you later on go on to develop this, do you recall?

A. I recall having at least partially built a box like that, yes, sir.

Q. Going on, what did you do next on the project?

A. I do not recall; however, Exhibit 16, page 73 and 74 and Exhibit 23-55 and 56 indicate to me that I designed a smaller more economical single-ended power source to run the circuitry. I apparently <sup>had</sup> ~~have~~ some problems with base breakdown and transistors and inserted diodes to correct that problem.

Q. Was that a power supply using line voltage?

A. Yes, sir, it was.

240 Q. What did you do next in the TV game development?

A. I do not recall; however, Exhibit 16, page 74 and 75 indicate to me that I reduced the complexity or tried to reduce the complexity of the delay multivibrators and the two transistor coincidence gate was reduced to a one transistor and two diodes to perform the same function in that coincidence gate.

241 Q. What coincidence was that gate intended to deal with?

A. That is just what I am trying to find, sir. The coincidence gate I referred to is shown in Exhibit 16, page 71, called a pulse shaper and and gate. I should say of that type.

242 Q. Leaving these exhibits for a moment, Mr. Harrison, are you familiar with the term Space War?

A. No, sir, I am not.

243 Q. Have you ever heard the term Space War?

A. Yes, sir.

244 Q. Under what circumstances have you heard the term Space War?

A. I believe I was asked by one of the attorneys if I had heard of it.



245 Q. Were you asked on more than one occasion?

A. Not that I recall, sir.

246 Q. Were you asked by more than one attorney?

254 A. Not that I recall, sir.

247 Q. Who was the attorney?

A. I don't recall if it was Mr. Anderson or  
Mr. Williams.

248 Q. When did this occur? That is, when did they ask  
255 you if you had heard of Space War?

A. I do not recall, sir.

249 Q. As of the time when you were asked if you had heard  
of Space War, had you heard of it prior to that?

256 A. No, sir, not to my knowledge.

250 Q. Have you discussed it with anyone since that  
time?

A. Not that I recall, sir.

251 Q. Do you have any idea of what the term Space War  
means?

A. I do not know. I have not seen anything - are you  
asking me to speculate? I assume it is some sort  
of game.

252 Q. On what basis do you have that assumption?

A. Because it was asked in connection with this.

253 Q. When you say in connection with this, what do you mean?

A. This TV game program that I was involved in.

254 Q. Do I understand correctly, then, that the only time that you ever discussed Space War with anyone was with an attorney, either Mr. Williams or Mr. Anderson?

A. As best I recall.

255 Q. Do you recall whether it was before or after you found out that your deposition was going to be taken?

A. I do not recall, sir.

256 Q. Returning now to the exhibits and your work on the TV game project, you had just referred to pages 74 and 75 of Exhibit 16 and the coincidence gate at the bottom of page 75. Would you go on now, please, to tell us what you did next on the TV game project?

A. I do not recall; however, Exhibit 16, page 76, has a drawing of a TV generator - TV generator circuitry which I apparently drew on that day.

257 Q. What day was that?

A. 7-13-67. There is Exhibit 16-76A, and attached

to it is a copy, 16-76B.

258 Q. Do you know what these drawings represent? You said a TV generator?

A. They represent to me at this time capability to produce two monochrome spots on a television screen and circuitry for, I believe, a target-shooting game.

259 Q. Do they incorporate the circuits that are shown individually on the preceding pages where you were making a revision in prior circuitry?

A. Yes, sir, they do.

260 Q. I don't know if you referred to Exhibit 16-71A which is attached to page 71, does that also relate to the same subject matter?

A. I believe I did, sir.

261 Q. I note that 16-71A bears a date 7-7-67 and then a note obsolete 7-13-67, W. L. H. in the center right portion of 16-71A?

A. Yes, sir, it does.

262 Q. And was that made obsolete by drawing 16-76A which bears the date July 13, '67?

A. I am not sure I understand what you said.

263 Q. Well, Exhibit 16-76A bears a date 7-13-67?

A. Yes, sir.

Q. Did that replace or make obsolete Exhibit 16-71B?

A. I can see that the update, 7-13-67 on 16-76A apparently refers to a note on Exhibit 16 page 76 that the inductive coupled signal is much too strong, went to capacitor divider on attached schematic. I apparently did some work on the RF portion of this circuit.

Q. What is the relation of 16-76A and 16-76B?

A. 16-76B I believe is the schematic I had before I made modifications and I updated the master copy, Exhibit 16-76A, I believe that is what happened.

AQ. So that the final version is 16-76A and the other

Q. two, 16-76B and 16-71A represent earlier versions?

A. 16-71A?

AQ. That was the one dated 7-7-67 and contained the

Q. note obsolete 7-13-67.

A. I believe that to be true, sir.

MR. WILLIAMS: Would you

A. repeat the last question and answer, please?

(Whereupon, the previous question and answer was read back by the reporter.)

268 Q. When we were just off the record, the witness asked  
 269 what was meant by final version in the previous  
 question and I meant the final version among the  
 three here, 16-71A, 16-76B and 16-76A. I understood  
 that these all three related to the revisions that  
 you had been testifying to individually in the  
 preceding pages.

7/14/76 A. But you did not mean that it was the final version  
 W.C.H. of a TV - - -

269 Q. Of a TV game?

A. Right.

270 Q. No, just of these three circuits.

A. I understand.

271 Q. One appearing to be an update of the next and  
 16-76A being a final update of the other two.

A. Yes.

272 Q. Perhaps so the record will be clear I had better  
 restate the question. Is 16-76B an update of  
 16-71A?

A. Is 16-76B an update of 16-76A?

273 Q. No, 16-71A.

A. Yes, sir, it is.

274 Q. And is 16-76A an update of 16-76B?

I believe I was speaking. 9/19/76 W.C.H.

A. Yes, sir, I believe it is.

275 Q. What did you do next in your work on the TV game project?

A. I would like to state at this time that Exhibit 23-59 is not clear to me as to what I may have been trying to do. I do not recall; however, Exhibit 23, page 57, indicates that I did some more resistance measurements on photoconductive cells.

276 Q. Was Mr. Rusch working on this part of the TV game project with you at the time that this work was being conducted by you?

MR. WILLIAMS: I object to the question, I don't understand what you mean by this part of the TV game.

277 Q. I will rephrase the question. Did Mr. Rusch have anything to do with the work that you have just been describing regarding photocells and the revision of some of these circuits?

A. Not that I recall, sir.

MR. WELSH: Let's adjourn until next Wednesday.

( Whereupon, the deposition in the above-entitled



matter was adjourned at 3:45 p.m.)

William L. Hovine

Deponent

THE STATE OF NEW HAMPSHIRE)

COUNTY OF Wilborough) SS.

Subscribed and sworn to before me this 13th

day of May 19 76.

Marilyn E. Trapakis

~~Justice of the Peace and/or~~  
Notary Public

Marilyn E. Trapakis

Notary Public

My Commission Expires March 19, 1980